I Claim:

1. A modem for receiving a multitone signal having a plurality of symbols with a cyclic extension of length M samples transmitted through a channel, the receiver comprising:

a signal input for receiving the multitone signal; and

a transversal equalizer connected to the signal input, the transversal equaliser including a Finite Impulse Response filter having coefficients such that the combined impulse response of the channel and the transversal equaliser targets a target impulse response having N taps, where N and M are integers and $N < (M+1)$.

2. A modem according to claim 1 wherein the modem has a bit adjustment means for lengthening or shortening one or more symbols for use in frequency domain interpolation.

3. A modem according to claim 1 wherein N=M.

4. A modem according to claim 1 wherein the target impulse response having N samples is internally represented by a data set having M+1 data elements, at least the first or last of the M+1 data elements being set to zero.

5. A modem according to claim 1 including calculation means for calculating the coefficients of the Finite Impulse Response filter to minimise an error function of the difference between the convolution of the channel with the transversal equaliser and a target impulse response having N taps.

6. A modem according to claim 1 wherein the difference between the combined impulse response of the channel and the transversal equaliser and the target impulse response is minimised.

7. A method of equalizing a multitone signal formed of a stream of multitone symbols having an extension of length M samples passing through a channel, the method including:

receiving the multitone signal having an extension of length M samples from the channel;

passing the multitone signal through a finite impulse response filter having filter coefficients; and

adjusting the filter coefficients so that the combined effect of the channel and the finite impulse response filter on the multitone signal targets a target impulse response having N samples, wherein N and M are integers and $N < (M+1)$.

8. A method according to claim 7 further including adding or deleting bits of as required to keep phase rotation of within predetermined limits.

9. A method according to claim 7 wherein N=M.

10. A method according to claim 7 wherein the target impulse response having N samples is internally represented by a data set having M+1 data elements, further including the step of setting at least the first or last of the M+1 data elements to zero.

11. A method according to claim 7 further including calculating the coefficients of the Finite Impulse Response filter to minimise an error function of the difference between the convolution of the channel with the transversal equaliser and a target impulse response having N taps.

12. A method according to claim 7 further including minimising the difference between the combined impulse response of the channel and the transversal equaliser and the target impulse response.

13. A computer program recorded on a data carrier for cooperating with a computer system having a processor and memory including code to cause the computer program to carry out the steps of:

receiving the multitone signal from the channel;

passing the multitone signal through a finite impulse response filter having filter coefficients; and

adjusting the filter coefficients so that the combined effect of the channel and the finite impulse response filter on the multitone signal targets a target impulse response having N samples, wherein N and M are integers and N < (M+1).

14. A computer program according to claim 11 further including code for frequency modulating the multitone signal.

15. A computer program according to claim 13 wherein N=M.

16. A computer program according to claim 13 wherein the target impulse response having N samples is internally represented by a data set having M+1 data elements, further including the step of setting at least the first or last of the M+1 data elements to zero.

17. A system comprising:

a first modem including:

a cyclic extension addition module for adding M extension samples to discrete multitone (DMT) symbols and

a D/A converter for transmitting the DMT symbols and extension samples into a channel; and

a second modem including:

a signal input connected to the channel; and

a transversal equalizer connected to the signal input, the transversal equaliser including a Finite Impulse Response filter having coefficients such that the combined impulse response of the channel and the transversal equaliser targets a target impulse response having N taps , where N and M are integers and N < (M+1).

18. A system according to claim 17 wherein the first modem includes frequency phase rotation means and bit addition and deletion means for adjusting the phase of transmitted bits.

19. A system according to claim 17 wherein each of the first and second modems include both transmission side circuitry including the cyclic extension addition module

and the D/A converter and receiving side circuitry including the signal input and the transversal equaliser.

20. A method of modem communication including:

transmitting first multitone signals from a first modem to a second modem through a channel, the multitone signals being formed of a stream of multitone symbols having an extension of length M samples;

transmitting second multitone signals from the second modem to the first modem through the channel, the multitone signals being formed of a stream of multitone symbols having an extension of length M samples;

in at least one of the two modems, rotating the phase of at least one of the signals and adding or deleting bits to the said at least one signal to align the symbols of the first and second signals;

receiving the multitone signals from the channel;

passing the multitone signals through a finite impulse response filter having filter coefficients; and

adjusting the filter coefficients so that the combined effect of the channel and the finite impulse response filter on the multitone signal targets a target impulse response having N samples, wherein N and M are integers and $N < (M+1)$.